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Nonlinear analysis of viscoelastic fluid flows in porous media with non-Fourier heat flux

Article

Jun 2026

Journal of Thermal Analysis and Calorimetry

Agossou Kinnou · Sèmako Justin Dèdèwanou · L. A. Hinvi · [...] · Jean Bio Chabi Orou

The nonlinear dynamics of a viscoelastic fluid saturating a heated porous medium are investigated numerically under the Cattaneo–Christov non-Fourier heat flux formulation. The momentum equation is governed by the Oldroyd-B constitutive model, which accounts for stress relaxation and strain retardation, while the hyperbolic energy equation incorpor...

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Feedback control and active synchronization of a financial system with integer and fractional order

Article

Mar 2026

The Journal of Nonlinear Sciences and Applications

Esther Souhou Ibirohounkè Akpado · Y. F. Pomalégni · Clément Miwadinou · [...] · Jean Bio Chabi Orou

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Nonlinear dynamics, adaptative control and synchronization of a finance system with integer and fractional order

Article

Nov 2025

Chaos Solitons & Fractals

Esther Souhou Ibirohounkè Akpado · Clément Miwadinou · Cyrille Ainamon · [...] · Jean Bio Chabi Orou

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Chaotic convection in a Heat transfer fluid in presence of helical force in a rotating porous medium

Article

Oct 2025

Nonlinear Science

Alexis Hounnan · Sèmako Justin Dèdèwanou · Clément Miwadinou · [...] · Jean Bio Chabi Orou

The present work deals with the study of the combined effect of helical and rotational forces on the chaotic convection of a Heat transfer fluid (HTF) with low Prandtl number in a porous medium using linear and nonlinear analysis. The rectangular porous layer is subjected to a vertical temperature gradient and a gravity field. Using the truncated G...

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Nonlinear dynamics and passive control of GLYCOLYTIC oscillations

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Oct 2023

Chaos Solitons & Fractals

Clément Miwadinou · Dagbégnon Luc Olabode · Vincent A. Monwanou · [...] · Jean Bio Chabi Orou

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Nonlinear dynamics, coexistence of attractors and microcontroller implementation of a modified Helmholtz Jerk oscillator

Article Full-text available

Jul 2023

Physica Scripta

Raymond Fangnon · Victor Kamdoum Tamba · Clément Miwadinou · [...] · Jean Bio Chabi Orou

In this work, we converted a two-dimensional modified Helmholtz oscillator into a three-dimensional modified Helmholtz jerk oscillator. The study of the stability of the fixed points is made and by using the theorem of Hopf, the condition of existence of the bifurcation of Hopf is sought. By numerical simulations relating to the diagrams of the bas...

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Thermal Convective Instabilities and Chaos in a Rotating Hybrid Nanofluid Layer with Cattaneo–Christov Heat Flux Model

Article Full-text available

Aug 2022

Complexity

Sèmako Justin Dèdèwanou · Vincent A. Monwanou · Aime A Koukpemedji · [...] · Jean Bio Chabi Orou

The linear and nonlinear dynamics of thermal convection of a rotating hybrid nanofluid layer heated from below with the Cattaneo–Christov heat flux model are studied in this paper. Starting from the flow equations of a hybrid nanofluid and exploiting the free boundary conditions, the analytical expressions of the stationary and oscillatory Rayleigh...

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Chaos and Its Control in a Fractional Order Glucose-insulin Regulatory System

Article

Aug 2022

Journal of Applied Nonlinear Dynamics

Yaovi Paul Dousseh · L. A. Hinvi · Clément Miwadinou · [...] · Jean Bio Chabi Orou

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Dynamicsanalysis, adaptive control, synchronization andanti-synchronization of a novel modified chaotic financial system

Article Full-text available

Aug 2022

International Journal of Dynamics and Control

Yaovi Paul Dousseh · Vincent A. Monwanou · Aime A Koukpemedji · [...] · Jean Bio Chabi Orou

In recent years, researchers from several fields including economics have developed models to better understand nonlinear phenomena such as chaos. To this direction, a novel chaotic financial system is presented in this paper. The nonlinear dynamics analysis of the proposed system has revealed some

interesting phenomena such as chaos and period-dou...

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Thermal Instability and Chaos in a Hybrid Nanofluid Flow

Article Full-text available

Jun 2022

International Journal of Bifurcation and Chaos

Sèmako Justin Dèdèwanou · Vincent A. Monwanou · Aime A Koukpemedji · [...] · Jean Bio Chabi Orou

In this work, the linear and nonlinear dynamics of thermal convection in an incompressible Newtonian (alumina-copper)/water hybrid nanofluid each confined in an infinite rectangular cavity and heated from below via the Cattaneo–Christov heat flux model are studied for volume fractions fixed between 0 and 0.05. Firstly, using the governed flow equat...

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Effects of linear and nonlinear dashpots forces on the dynamics of plants vibrating in a vegetation cover situation

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Mar 2022

Physica Scripta

H. François Dozounhékpon · Aime A Koukpemedji · Vincent A. Monwanou · [...] · Jean Bio Chabi Orou

This paper considers the nonlinear dynamics of the oscillations of an individual plant forced by the fluctuating aerodynamic drag and significantly influenced by collisions with its close neighbors. In this study, a row of identical and flexible oscillators is considered. The flexible beams theory is used to model the equation of motion of an indiv...

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Active control of the instability of a dynamic laminar boundary layer on a flat impermeable plate subjected to a magnetic field

Article

Feb 2022

Indian Journal of Physics

Toha François Lihonou · Vincent A. Monwanou · Clément Miwadinou · Jean Bio Chabi Orou

We study the effect of the magnetic field through the analysis of the linear temporal stability of the flow of a viscous, incompressible and electrically conductive fluid forming a dynamic laminar boundary layer on an impermeable horizontal flat magnetic plate. The basic flow is assumed to be laminar and two-dimensional. The basic flow velocity pro...

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Non-linear dynamics of the oscillations of the plant in a vegetation cover situation under the effects of the wind

Article Full-text available

Feb 2022

The European Physical Journal B

H. François Dozounhékpon · Aime A Koukpemedji · Vincent A. Monwanou · [...] · Jean Bio Chabi Orou

This work considers the nonlinear dynamics of the oscillations of plants in situations of vegetation cover under the effect of the wind. A row of identical oscillators is considered to take into account the contribution of close neighbors on the dynamics of an individual plant and the beam theory is used to model the equation of motion of the syste...

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Corrigendum to "Chaos in a Financial System with Fractional Order and Its Control via Sliding Mode"

Article Full-text available

Nov 2021

Complexity

Yaovi Paul Dousseh · Cyrille Ainamon · Clément Miwadinou · [...] · Jean Bio Chabi Orou

In this paper, the dynamical behaviors and chaos control of a fractional-order financial system are discussed. The lowest fractional order found from which the system generates chaos is 2.49 for the commensurate order case and 2.57 for the incommensurate order case. Also, the period-doubling route to chaos was found in this system. The results of t...

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Influence of amplitude-modulated excitation on the dynamic behaviour of polarisation of a material

Article

Oct 2021

Pramana

Cyrille Ainamon · L. A. Hinvi · Fébron Cyrus Patinvoh · [...] · Jean Bio Chabi Orou

This work concerns the modelling of the dynamics of polarisation of a centrosymmetric material subjected to an amplitude-modulated excitation (AME). The dynamic equation obtained for the polarisation is the Duffing equation with nonlinearities of orders 3 and 5. With the multiple scale method, the nonlinear resonances are studied. Periodic, multipe...

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Resonance, chaos and coexistence of attractors in a position dependent mass-driven Duffing-type oscillator

Article Full-text available

Aug 2021

Journal- Korean Physical Society

L. A. Hinvi · Aime A Koukpemedji · Vincent A. Monwanou · [...] · Jean Bio Chabi Orou

This paper addresses the dynamics of a position-dependent mass-driven Duffing-type oscillator (PDM oscillator) subjected to periodic excitation. The approximate equation of the PDM oscillator is considered to analyze the harmonic oscillations and the possible resonance states. The Amplitudes and frequencies of possible resonances are found by using...

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Chaos in a Financial System with Fractional Order and Its Control via Sliding Mode

Article Full-text available

Jul 2021

Complexity

Yaovi Paul Dousseh · Cyrille Ainamon · Clément Miwadinou · [...] · Jean Bio Chabi Orou

In this paper, the dynamical behaviors and chaos control of a fractional-order financial system are discussed. The lowest fractional order found from which the system generates chaos is 2.49 for the commensurate order case and 2.13 for the incommensurate order case. Also, period-doubling route to chaos was found in this system. The results of this...

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AN ABSOLUTE MEMRISTOR HELMHOLTZ OSCILLATOR: DYNAMICAL ANALYSIS, ELECTRONIC IMPLEMENTATION AND SYNCHRONIZATION

Chapter

Jul 2021

Cyrille Ainamon · A. Chéagé Chamgoué · Sifeu Takougang Kingni · [...] · Paul Woafo

This chapter proposes a memristor Helmholtz (MH) oscillator which is designed by adding an ideal and active flux-controlled memristor in the circuit of an autonomous Helmholtz jerk oscillator. The dynamical behaviour of the MH oscillator is investigated in terms of equilibria states and their stabilities, bifurcation diagrams, Lyapunov exponents, p...

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Chaotic Convection in a Horizontal Cavity Filled with (Alumina–copper)/ Water Hybrid Nanofluid Heated from below in Presence of Magnetic Field

Article

May 2021

Brazilian Journal of Physics

Sèmako Justin Dèdèwanou · L. A. Hinvi · Clément Miwadinou · [...] · Jean Bio Chabi Orou

In this paper, the characteristics of the nonlinear dynamics of thermal convection in two nanofluids and their hybrid each confined in an infinite rectangular cavity and heated from below in the presence of vertical magnetic field are studied for volume fractions fixed between 0 and 0.04. The use of the truncated Galerkin approximation made it poss...

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Chaos control and synchronization of a new chaotic financial system with integer and fractional order

Article Full-text available

Apr 2021

The Journal of Nonlinear Sciences and Applications

Yaovi Paul Dousseh · C. Ainamon · Clément Miwadinou · [...] · Jean Bio Chabi Orou

Synchronization of chaotic dynamical systems with fractional order is receiving great attention in recent literature because of its applications in a variety of fields including optics, secure communications of analog and digital signals, and cryptographic systems. In this paper, chaos control of a new financial

system, and chaos synchronization be...

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Adaptive Control of a New Chaotic Financial System with Integer Order and Fractional Order and Its Identical Adaptive Synchronization

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Mar 2021

Mathematical Problems in Engineering

Yaovi Paul Dousseh · Cyrille Aïnamon · Clément Miwadinou · [...] · Jean Bio Chabi Orou

In this paper, adaptive control and adaptive synchronization of an integer and fractional order new financial system with unknown constant parameters are studied. Based on Lyapunov's stability theory, an adaptive control law is designed to asymptotically stabilize the state variables of the system to the origin in integer and fractional order cases...

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Analysis, circuit realization and controls of an autonomous Morse jerk oscillator

Article

Mar 2021

SeMA Journal

Cyrille Ainamon · Victor Kamdoum Tamba · Justin Roger Mboupda Pone · [...] · Jean Bio Chabi Orou

In this paper, an autonomous Morse jerk oscillator which is designed by converting an autonomous two-dimensional Morse oscillator to a jerk oscillator, is analysed. The stability of its unique equilibrium point reveals the existence of Hopf bifurcation. Periodic and chaotic oscillations, antimonotonicity, chaotic bubbles and coexisting attractors a...

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Memristor Helmholtz oscillator: analysis, electronic implementation, synchronization and chaos control using single controller

Chapter

Jan 2021

Cyrille Ainamon · A. Chéagé Chamgoué · Sifeu Takougang Kingni · [...] · Paul Woafo

This chapter proposes a memristor Helmholtz (MH) oscillator which is designed by adding an ideal and active flux-controlled memristor in the circuit of an autonomous Helmholtz jerk oscillator. The dynamical behavior of the MH oscillator is investigated in terms of equilibria states and their stabilities, bifurcation diagrams, Lyapunov exponents, ph...

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Directly modulated semiconductor ring lasers: Chaos synchronization and applications to cryptography communications

Article

Jun 2020

Chaos Theory and Applications

Sifeu Takougang Kingni · Cyrille Ainamon · Victor Kamdoum Tamba · Jean Bio Chabi Orou

This paper numerically investigates the synchronization and the chaos-based

encryption using unidirectional coupled chaotic semiconductor ring lasers (SRLs) with direct modulation. A good quality of synchronization and transmission of messages are realized for specific choice of system parameters. The mismatches of typical internal SRLs parameters...

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Modeling and study of dynamics of micro-beam coupled to two Josephson junctions

Article Full-text available

Apr 2020

IOP Publishing **Physica Scripta**

Noudéhouénou Gilles Koudafoke · Clément Miwadinou · L. A. Hinvi · [...] · Jean Bio Chabi Orou

In this work, we proposed to study the dynamics of a bi-recessed micro-beam coupled magnetically to two Josephson junctions. After building a model of MEMS (Micro Electro Mechanical Systems), the equations of their dynamics are determined. The fixed points of system are analytically checked and their stability is analyzed by using the Routh-Hurwitz...

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Fractal Josephson junction with unharmonic current-phase relation: Analysis and FPGA implementation

Conference Paper

Nov 2019

Sifeu Takougang Kingni · G.K. Fautso · Victor Kamdoum Tamba · [...] · Jean Bio Chabi Orou

In the literature, Josephson junction (JJ) devices can be described by a resistive-capacitive shunted junction or resistive-capacitive-inductive shunted junction. Firstly, a fractal JJ with unharmonic current-phase relation (FJJUCPR) described by a linear resistive-capacitive shunted junction (LRCSJ) model is analytically and numerically analyzed i...

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Analysis and FPGA implementation of an autonomous Josephson junction snap oscillator

Article

Oct 2019

The European Physical Journal B

Sifeu Takougang Kingni · Karthikeyan Rajagopal · Victor Kamdoum Tamba · [...] · Jean Bio Chabi Orou

An autonomous Josephson junction (JJ) snap oscillator is designed and investigated in this paper. Depending on DC bias current, the proposed snap oscillator has two or no equilibrium points. The stability analysis of the two equilibrium points shows that one of the equilibrium point is unstable and the existence of Hopf bifurcation is established f...

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Stability and chaotic dynamics of forced ϕ8 generalised Liénard systems

Article Full-text available

Aug 2019

Pramana

Clément Miwadinou · Vincent A. Monwanou · L. A. Hinvi · Jean Bio Chabi Orou

This work studies a forced generalised Liénard oscillator with $\phi 8$ potential with order 8 dissipation. The fixed points and their stability have been analysed for autonomous and non-dissipative Liénard oscillator. The system can exhibit three, five or seven fixed points and the corresponding stability diagram is checked and analysed. The effect of r...

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Analysis of a Fractal Josephson Junction with Unharmonic Current-Phase Relation

Article Full-text available

Aug 2019

Journal of Superconductivity and Novel Magnetism

Sifeu Takougang Kingni · G.K. Fautso · Victor Kamdoum Tamba · [...] · Jean Bio Chabi Orou

In this paper, a fractal Josephson junction with unharmonic current-phase relation is analytically and numerically analyzed. This system has two, four, or no equilibrium points depending on the external direct current source and unharmonic parameter. The stability analysis of the equilibrium points is carried out. The inclusion of unharmonic curren...

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Determination of Analytical Solution and Limit Cycle of Nonlinear Chemical Oscillations

Article Full-text available

Mar 2019

Applied Physics Research

Dagbégnon Luc Olabode · Julien Yovogan · Jean Bio Chabi Orou

This work studies the determination of analytical solution and cycle limite in nonlinear chemical oscillations gouverned by a forced modified Van der Pol-Duffing oscillator. We considered the dynamic of nonlinear chemical systems subjected to an external sinusoidal excitation. The first order appoximative solution of the oxcillator is determined us...

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Active Control of Chaotic Oscillations in Nonlinear Chemical Dynamics

Article Full-text available

Mar 2019

Journal of Applied Mathematics and Physics

Dagbégnon Luc Olabode · Batablinlè Lamboni · Jean Bio Chabi Orou

This work studies the active control of chemical oscillations governed by a forced modified Van der Pol-Duffing oscillator. We considered the dynamics of nonlinear chemical systems subjected to an external sinusoidal excitation. The approximative solution to the first order of the modified Van der Pol-Duffing oscillator is found using the Lindstedt...

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Horseshoes chaos and its passive control in dissipative nonlinear chemical dynamics

Article Full-text available

Aug 2018

IOP Publishing **Physica Scripta**

Dagbégnon Luc Olabode · Clément Miwadinou · Vincent A. Monwanou · Jean Bio Chabi Orou

This work deals with the passive control of horseshoes chaos in dissipative nonlinear chemical oscillations which concentration dynamics are governed by a forced modified Van der Pol-Duffing oscillator. We considered the dynamics of nonlinear chemical systems subjected to fluctuating hydrodynamic drag forces. The influences of the such parameter of...

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Non-Linear Effects in Flow in Porous Duct

Article Full-text available

Oct 2013

Hafeez Y Hafeez · Jean Bio Chabi Orou · Omololu A. Ojo

In general, it is assumed in some non viscous flows that the flow velocity is constant at a cross-section. In this paper, we impose more realistic boundary conditions by, for example, introducing viscosity, and suction at walls, the net mass flow will change since the continuity equation must hold. The convective acceleration terms will be products...

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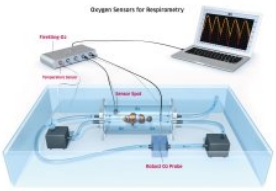

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